

REMARKS

This is in response to the Office Action that was mailed on March 14, 2005. The recitation of claim 2 is incorporated into claim 1, and claim 2 is cancelled, without prejudice. Claim 3 is recast in independent form. Corresponding changes are made to the dependencies of claims 4-6. Finally, minor formal amendments are made to claims 1, 4, 5, and 7. No new matter has been introduced. Claims 1 and 3-7 are pending in the application.

Objection was raised to claims 1 and 7, due to their use of the terminology “characterized in that”. That terminology has been removed from the claims in question, thereby obviating this ground of objection.

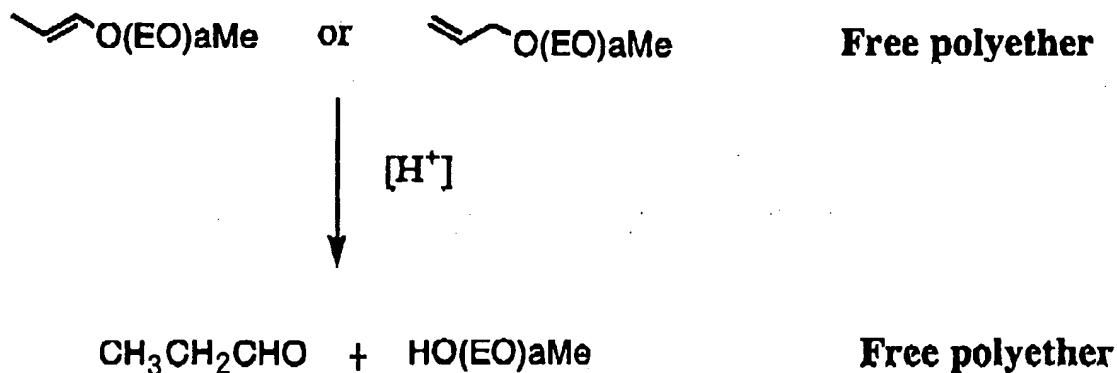
Objection was raised to claims 5-6, the Examiner arguing that “at least one end thereof” referring to a silicone in claim 5 is inconsistent with the depiction of a silicone recited in claim 1. Claim 5 refers to a silicone which is a *precursor* of the silicone recited in claim 1. Accordingly, it is respectfully submitted that there is no inconsistency, and withdrawal of this ground of objection is respectfully solicited.

Claims 1-6 were rejected under the second paragraph of 35 U.S.C. §112, the Examiner stating that the expression in claim 1 “ $1 \leq x+y$ ” is confusing because $x+y$ cannot be 0. The Examiner is correct that $x+y$ cannot be 0. The expression in question is simply a mathematical way of expressing the condition “wherein x is 0 or 1, y is 0 or 1, but both x and y may not be 0 at the same time”. The expression in question as defined in claim 1 has three possible

embodiments: $x = 0, y = 1$; $x = 1, y = 0$; and $x = 1, y = 1$. Nevertheless, in order to expedite the prosecution of this application, the expression in question has been replaced by the equivalent expression " $x+y \geq 1$ ". Withdrawal of this ground of rejection is respectfully solicited.

Claims 1-6 were rejected under 35 U.S.C. §102(b) as being anticipated by US 5,288,831 (Ichinohe). Claim 4 was rejected under 35 U.S.C. §103(a) as being unpatentable over Ichinohe. Claim 3 was rejected under 35 U.S.C. §103(a) as being unpatentable over Ichinohe in view of US 4,150,048 (Schilling). Each of these rejections is respectfully traversed.

In the Ichinohe reference, the residual propenyl ether polyether is decomposed, and propionaldehyde produced by the decomposition is then removed. Column 4, lines 35-37. The propionaldehyde is produced according to the following reaction scheme, in which the double bond is decomposed:



In the above sketch, "EO" represents an ethylene oxide residue, that is, $-\text{CH}_2\text{CH}_2\text{O}-$, and "ME" represents a methyl group, $-\text{CH}_3$.

In this reaction scheme, the upper "Free polyether" means polyethers which have not reacted with organohydrogensiloxanes. They are converted to the corresponding hydroxyl polyethers of the formula $\text{HO}(\text{EO})_n\text{Me}$. The hydroxyl polyethers are not bonded to the silicone chain, either, and thus they are "free polyethers". These hydroxyl polyethers cannot be distilled off, due to a relatively higher molecular weight of the polyether residues. Thus, in the Ichinohe reference, the polyether silicone contains hydroxyl polyether which is not bonded to the silicone chain in the same molar amount as that of the unreacted polyether.

As indicated in the present specification, the amount of such unreacted polyether is about 15 weight-%: "It has been found that as much as about 15 wt% of the fed polyether is not bonded to a hydrogendimethylpolysiloxane if a hydrogen dimethylpolysiloxane is reacted with a polyether having a $\text{CH}_2=\text{CHCH}_2$ group in a molar ration, Vi/SiH , of about 1". Specification, page 6, lines 17-20.

Turning back to Ichinohe, in Example 1, described in column 6, lines 57-68, the molar ratio, Vi/SiH , is about 1. This can be seen from the following calculation:

The molecular weight of the hydrogen siloxane = 4,782

The amount of $\text{SiH} = 717\text{g} / 4,782 \times 3 = 0.45$ mole

The molecular weight of the allyl polyether = 468

The amount of vinyl group = $219\text{g} / 468 = 0.47$ mole

$\text{Vi}/\text{SiH} = 0.47 / 0.45 = 1.04$.

Accordingly, in Ichinohe, the weight ratio of the unreacted polyether is about 15 wt%. As explained above, the unreacted polyether is converted to the corresponding hydroxyl polyether of the formula $\text{OH}(\text{C}_2\text{H}_4\text{O})_n\text{CH}_3$. This has a molecular weight of 428, so that the weight ratio of the

non-bonded polyether is 13.7 wt% (=15x428/468). Thus, Ichinohe does not teach or suggest the element of the present invention: "the polyether residue bonded to the silicone chain of the polyethersilicone is 8 % or less."

Thus, for reasons detailed above, the present invention is novel with respect to the Ichinohe reference.

The present invention resides in the *selection* of specific polyethersilicones among various polyethersilicones described in Ichinohe. The selected polyethersilicones have an advantage over the other polyether silicones, which advantage is not predictable from the Ichinohe disclosure.

The unexpected advantage which characterizes the present invention is shown in Table 2 on page 18 in the specification. In Table 2, the polyethersilicones of the present invention, A to E, had significantly higher ionic conductivity than the comparative polyethersilicones G and H. The polyethersilicones A to E are modified at an end of the silicone chain, while the silicones G and H are modified at a silicon atom *within the chain* of the siloxane, as represented by the formula (19) or (20), respectively.

The Ichinohe disclosure generically covers both types of polyether silicones, but does not provide any motivation for a skilled person to select the present narrow group of polyethersilicones from all of the other polyethersilicones disclosed in the reference. Rather, the Ichinohe patent focuses mostly on silicones modified at a silicon atom *within the chain*, as can be seen from the Examples where all of the silicones described are modified *within the chain*. Accordingly, for reasons detailed above, the present invention is unobvious with respect to the Ichinohe reference.

In conclusion, the presently claimed invention is novel over Ichinohe in that the amount of non-bonded polyether is 8 wt% or less. Further, Ichinohe does not teach how to reduce the free polyether at all. Therefore, the present invention is also unobvious over Ichinohe. The present silicone is modified specifically at an end of the silicone chain to provide higher conductivity, which is neither taught nor suggested by the Ichinohe reference. Therefore, the present invention is novel and unobvious over Ichinohe. Inasmuch as Ichinohe neither teaches nor suggests a process to reduce non-bonded polyether to 8wt% or lower, method claim 7 is novel and unobvious over Ichinohe. The presently claimed polyethersilicones modified at an end of a silicone chain thereof are neither taught nor suggested by the Ichinohe reference, alone or in view of Schilling.

Claims 1, 4, and 6 were rejected under 35 U.S.C. §102(b) as being anticipated by EP 0 995 771 A2 (Petroff).

The polyethersilicones of claim 1 as amended has at least one polyether residue represented by the following formula, $-C_aH_{2a}O(C_2H_4O)_bR$, wherein a is 3 or 4, b is an integer of from 1 to 3, and R is a CH_3 group or a C_2H_5 group. Accordingly, the spacer between the polysiloxane and the polyoxyalkylene is a group represented by the formula, $-C_3H_6O-$ or $-C_4H_8O-$.

In Petroff, such a spacer cannot be formed, because Petroff employs solely a vinyloxy polyoxyalkylene compound. The vinyloxy group produces a spacer between the polysiloxane and the polyoxyalkylene which is inevitably $-C_2H_4OR-$. Therefore the presently composition of matter claims 1, 4, and 6 are novel with respect to Petroff.

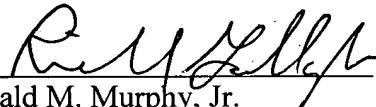
Petroff teaches that isomerization can be avoided by using the vinyloxy polyoxyalkylene compound. Therefore, a person of ordinary skill in the art is not motivated to use a polyoxyalkylene compound having another type of an unsaturated group than the vinyloxy group. Accordingly, the invention of claims 1 and its dependent claims, 4 and 6, are unobvious over Petroff.

If any questions arise regarding the above matters, please contact Applicant's representative, Richard Gallagher (Reg. No. 28,781), in the Washington Metropolitan Area at the phone number listed below.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 02-2448, under Order No. 4710-0105P from which the undersigned is authorized to draw.

Dated: June 14, 2005

Respectfully submitted,

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